ABOUT THE NEGATIVE PRESSURE EFFECT TO THE EJECTION OF SUBSTANCES FROM FACE SURFFACE OF ALUMINUM TARGET

I.K. Krasyuk[1], P.P. Pashinin[1], A.Yu. Semenov[1], I.A. Stuchebryukhov[1], K.V. Khishchenko[2]

[1] *Prokhorov General Physics Institute of RAS, Moscow, Russia*

[2] *Joint Institute for High Temperatures of RAS, Moscow, Russia*

E-mail: krasyuk99@rambler.ru

With the laser installation “Kamerton-T” experiments were done for the estimation of the ablative pressure on the surface of the aluminum target from the intensity of the laser pulse with duration 70 ps. The wavelength of the laser radiation is 0.527 microns. It is established that in the range of laser radiation intensity 1 - 400 TW/cm^2, the desired dependence is of the form:

P_a(TPa) = a [10^{-2} I_{laser}(TW/см^2)]b, here a = 1.9±0.2, b=0.7±0.03.

This conclusion is made on the basis of experimental measuring arriving times of the shock wave to the back surface of the target depending on the intensity of the laser radiation. Through a numerical simulation the values of the corresponding ablation pressures were found using the measured data. The result obtained is in satisfactory agreement with the data of other authors.

As a result of the experiments it was found that the depth of the crater on the face surface of the target after laser impact is much greater than the thickness of the layer evaporated after the laser ablation. Numerical analysis showed that this is the result of fusion of the substance behind the shock wave front (see Fig. 1.) with the subsequent action of the pulse of negative pressure accompanying the pressure pulse in a shock wave.

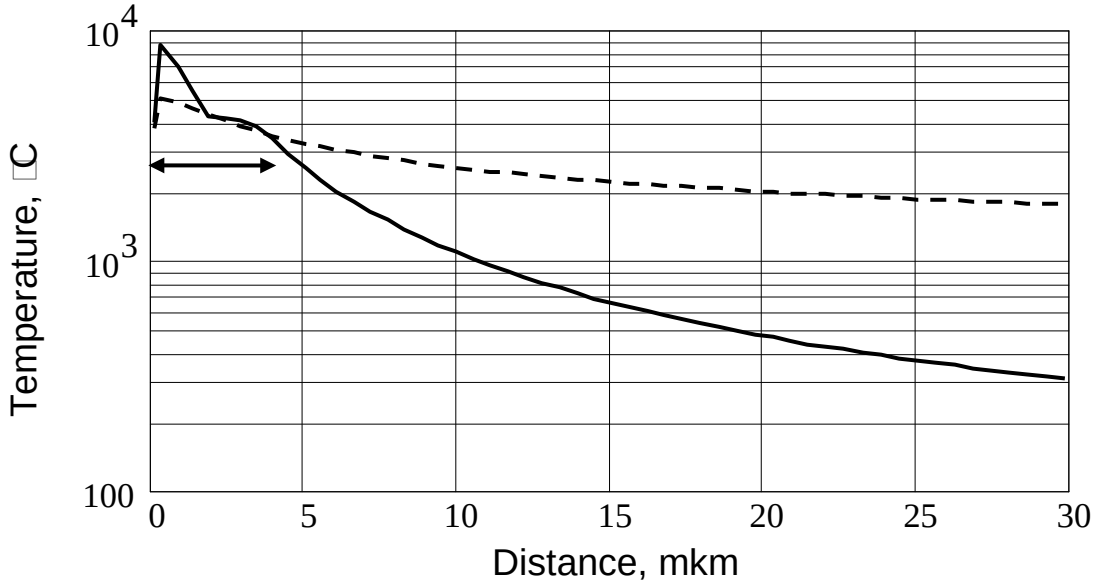

Fig. 1. Graphs of the distribution at a target temperature behind shock wave front (solid line) and of the melting curve (dashed line). Arrow denotes the area of the substances in the molten state.